INTANGIBLE ASSETS AND DEBT CONTRACTING: AN INVESTIGATION OF THE DETERMINANTS OF NET-WORTH COVENANTS

by

He Wen

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STATEMENT OF DISSERTATION APPROVAL

The dissertation of He Wen

has been approved by the following supervisory committee members:

Marlene Plumlee	, Co-Chair	6/13/13 Date Approved
Christine Botosan	, Co-Chair	6/13/13 Date Approved
Rachel Hayes	, Member	6/13/13 Date Approved
Michael Cooper	, Member	6/13/13 Date Approved
Haimanti Bhattacharya	, Member	6/13/13 Date Approved

and by William Hesterly , Associate Dean of the David Eccles School of Business

and by Donna M. White, Interim Dean of The Graduate School.

ABSTRACT

This dissertation explores the determinants of the inclusion of total-asset net-worth covenants in debt contracts. Frankel, Seethamraju, and Zach (2008) find that the magnitude of intangible assets is positively associated with the inclusion of total-asset net-worth covenants. This finding raises the question of why such an association exists, given that intangible assets can be worthless at liquidation and generate cash flows with high uncertainty. To answer this question, I examine if the decision to include intangible assets in debt covenants is a function of three factors: borrowing firms' reliance on future cash flows related to intangible assets to make loan payments, lenders' industry expertise, and access to private information. I find that debt contracts are more likely to include total-asset net-worth covenants when borrowers have higher debt-to-tangible assets ratio. I also find that debt contracts are more likely to include total-asset net-worth covenants when lenders have expertise in the borrowing firm's industry or have a longer lending relationship with the borrowing firm. These findings help us to understand why intangible assets are employed in some debt covenants, and they shed new light on the information needs for intangible assets in debt contracting.

To my husband, Fei, and my children, William, Timothy, and Nathan

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CHAPTER 1

INTRODUCTION

Intangible assets account for a significant portion of U.S. corporate assets. Between 2005 and 2011, about half of U.S. public firms reported goodwill on their balance sheets, and among those reporting goodwill, goodwill averaged 14-15% of total assets. Despite the economic importance of intangible assets, prior research argues against a role for these assets in debt contracting because they can be worthless at liquidation, present a high degree of uncertainty in underlying cash flows, and are measured for accounting purposes using highly subjective rules (e.g., Holthausen & Watts, 2001; Watts, 2006).

Nevertheless, some studies present evidence of the use of intangible assets in debt contracts. Frankel, Seethamraju and Zach (2008) find that debt contracts are more likely to use a Total-Asset Net-Worth covenant (i.e., intangible assets are included in the net-worth calculation), when intangible assets comprise a larger percentage of total assets.[1] This association is consistent with the magnitude of intangible assets being an important factor in the use of these assets in debt covenants, but does not address the question of

[1] A Tangible Net-Worth covenant excludes intangible assets in its net-worth calculation while a Total-Asset Net-Worth covenant includes intangible assets.

why this is the case.[2] To shed light on this question, I investigate several additional possible determinants of the inclusion of intangible assets in net-worth covenants.

Specifically, I explore the following three possible determinants of the inclusion of a Total-Asset Net-Worth covenant (hereafter, TOTNW): the reliance on intangible assets to make debt payments, lenders' industry expertise, and lenders' access to private information related to intangible assets. As explained in greater detail later in my thesis, I employ the debt-to-tangible assets ratio to proxy for the borrowing firms' reliance on intangible assets to make debt payments, the number of participant lenders who have previous lending experience in the borrower's industry to proxy for lender's industry expertise, and the average length of time that the lead lender(s) has been the lead arranger for the borrowing firm to proxy for the lender's access to private information.

Aghion and Bolton's (1992) model suggests that debt covenants protect lenders by granting them the right to alter their relationship with borrowers in certain states of the world.[3] This implies that debt covenants are more effective when the accounting numbers are employed in covenants that correlate with the states of the world.[4] This is especially

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[2]Frankel et al. (2008) do not provide a *directional* prediction about the association between the magnitude

[3] In Aghion and Bolton (1992), the signal is exogenously given and is imperfectly correlated with the state. The true state is perfectly observable to both contracting parties although the state is not contractible. Both the state and the signal arise before the manager takes his action.

[4] I follow Banker and Datar (1989) and characterize the correlation between the states of world and accounting numbers in terms of sensitivity and precision of accounting numbers. In Banker and Datar (1989), sensitivity is defined as the sensitivity of signals to managers' actions and precision is defined as the inverse of the variation of the signal.

crucial in down states of the world, since lenders face asymmetric payoff structures, and are ultimately concerned whether they will get fully repaid.

Research that argues against a role for intangible assets in debt contracts rests on the argument that intangible assets are irrelevant to lenders' welfare due to the fact that intangible assets are expected to lose value upon liquidation and are reported based on subjective rules. This suggests that intangible assets are insensitive and noisy signals about states of the world.[5] Nevertheless, recent research provides evidence suggesting that intangible assets play a role in debt contracts in some circumstances (e.g., Frankel et al., 2008; Loumioti, 2012). To shed light on the issue, I explore situations in which intangible assets could be relevant to lenders' welfare and the close and effective monitoring of managers' reporting is possible. I find that under these circumstances, intangible assets are included in covenants, which is consistent with the idea that when intangible assets are a more sensitive and precise signal, they are more likely to be employed in debt covenants.

I argue that intangible assets are relevant to lenders' welfare when future cash flows generated by intangible assets are a potential source of debt payments. I use the debt-to-tangible assets ratio to capture the extent to which debt payments might rely on cash flows produced by intangible assets. Consistent with my prediction, I find that

[5] Theoretical research usually assumes signals are exogenously given and no conflicts about which signal is written into covenants. In the case of intangible assets, the contracting parties might have disagreements over whether intangible assets will be sensitive and precise about the state of the world. Prior research generally agrees that intangible assets present economic benefits to equity-holders, but suggests that these assets are worthless to lenders, although recent evidence suggests that this might not be the case in some circumstances (e.g., Frankel et al., 2008; Loumioti, 2012; Plumlee, Xie, Yan, & Yu, 2012).

firms' debt-to-tangible assets ratio is significantly and positively associated with the inclusion of TOTNW in levels analysis. This result is robust to controlling for the positive association documented in prior research between intangible assets as a percentage of total assets and the use of TOTNW covenants. Thus, my finding suggest that it is not the size of the intangible assets vis-à-vis total assets that is important for the decision to employ a TOTNW, but the extent to which the future cash flows generated by intangible assets might be relied upon debt payments. Furthermore, this result demonstrates that intangibles could be relevant to lenders' interests, which disputes the prior belief that the liquidation value of intangibles is the only concern for lenders.

An important characteristic of intangible assets is that evaluating these assets relies heavily on internal information, such as the projection of firms' performance. Goodwill, the most significant intangible asset on corporate balance sheets, is a good example. SFAS 142 requires the recorded value of goodwill to be assessed for impairment in a manner that relies heavily on managerial judgment and projections.[6] In contrast, external information, such as observable market values, is more likely to be available when tangible assets are valued. Thus, the information sources and subjective reporting rules for intangible assets suggest that lenders' ability to effectively monitor the value of intangible assets could be an important factor in determining whether intangible assets are included in covenants.

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[6] SFAS 142 requires valuation technique (e.g., discounted cash flow model) to estimate the fair value of a reporting unit when quoted market prices are not available, which serves as the first-step of impairment test. The Accounting Standards Update No. 2011-08 eliminates this quantitative test and only requires *qualitative* evaluation when it is more likely than not that the fair value of a reporting unit is less than its carrying amount.

I argue that lenders are more likely to have greater monitoring ability if they have industry expertise or access to private information. Industry expertise gives lenders an understanding of the industry's economic conditions, which is a key input into the evaluation of intangible asset values. Further, an existing relationship with borrowers might provide lenders with greater access to private information such as managers' inputs into the discounted cash flow models employed to evaluate goodwill, and a more complete understanding of the company and its economic situation.

To capture lenders' industry expertise, I use the number of participant lenders who have experience lending to the borrowing firm's industry over the 5 years preceding the loan issue date. I measure lenders' access to private information by the average length of time that the lead lender(s) has been the lead arranger for the borrowing firm. This measure captures two key characteristics to proxy for factors that enhance lenders' information access – a previous transaction and longevity of the relationship (Berger & Udell, 1995; S. Bharath et al., 2007).

As predicted, I find that lenders' industry expertise is positively associated with the inclusion of TOTNW. This result holds after controlling for the proportion of assets that are intangible assets. This finding contributes to our understanding of the role that lenders play in the use of intangibles in debt contracts. The association between access to private information (*RelaLend*) and the inclusion of TOTNW is statistically insignificant. This result suggests that access to private information (as proxid for by *RelaLend*) is not a significant factor in the decision to include intangible assets in debt covenants.

Alternatively, this nonresult might be due to inadequate controls for differences between the comparison groups. I address this latter issue via the changes analysis I describe next.

I conduct a changes analysis to address the above concern and provide additional support for my levels analysis. The change analysis mitigates the concern that time-invariant unobservable factors drive the associations I document here. It also mitigates the concern that inadequate control for differences between the comparison groups included in my analysis leads to a lack of testing power in the levels analysis. The changes analysis employs a subsample of the firms that move from using a Tangible Net-Worth covenant (hereafter TANNW) to TOTNW, and vice versa. I find that increases in the debt-to-tangible assets ratio are positively associated with changes from TANNW to TOTNW, even after controlling for the changes in the proportion of assets that are intangible. This confirms the results of my levels analysis. In addition, I find that an increase in the number of participant lenders with lending experience in the borrowing firm's industry over the 5 years preceding the loan issuance date and a lengthening of the average time that the lead lender(s) has been the lead arranger for the borrowing firm is associated with the movement from TANNW to TOTNW. Thus, the results from the changes analysis support all three predictions, confirm and strengthen the results of my levels analysis, and provide evidence of a causal relationship between these factors and the use of TOTNW.

I focus on the net-worth covenant because it is frequently used in debt covenants (Dichev & Skinner, 2002) and can be defined in debt contracts to include/exclude

intangible assets.[7] Thus, this covenant is particularly relevant to the understanding of the role of intangible assets in debt contracting.

My study contributes to the emerging literature on the role of intangibles in debt contracts (Frankel et al., 2008; Loumioti, 2012) by exploring the effect of borrower and lender characteristics. My results suggest that intangible assets are not shunned by contracting parties, but are included in debt contracts when intangible assets are economically relevant to their interests. This finding provides evidence that contracting parties consider more than the event of liquidation when evaluating the relevance of intangible assets to their interests. Second, my findings contribute to the literature that examines the implications of lender characteristics for debt contracting (S. Bharath et al., 2007; e.g., Ivashina & Sun, 2011) and for the use of intangible assets in debt contracts (Loumioti, 2012). Finally, my findings suggest that lenders can have an information advantage (i.e., industry expertise and access to private information) to effectively monitor and evaluate reported intangible assets. This is in contrast to prior research that argued that lenders would not care about intangible assets.

The remainder of my dissertation is organized as follows: Chapter 2 provides a review of the literature on intangible assets and debt covenants; Chapter 3 develops the

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[7] More specifically, I focus on the inclusion/exclusion of intangible assets in net-worth covenants. Slackness of net-worth covenants is not emphasized in this paper because covenant slackness does not address the different potential roles of intangible assets. As Guay (2008) notes "threshold that provides no slack, the initial net worth threshold can be set at tangible net worth in the presence of an intangible asset exclusion provision (or at reported net worth in the absence of an intangible asset exclusion provision). The key role of debt covenants, however, is to mitigate agency conflicts associated with future actions that can be taken by managers. Thus, even though the initial net-worth threshold can be set to any tightness desired, the constraints on managers' future behavior will differ depending on the specific provisions of the covenant."

hypotheses; Chapter 4 presents the research design; Chapter 5 provides a presentation and discussion of the sample selection and descriptive statistics; Chapter 6 provides a presentation and discussion of results; Chapter 7 discusses future research opportunities; and Chapter 8 summarizes and provides concluding remarks.

CHAPTER 2

LITERATURE REVIEW

In this chapter, I first discuss the economic characteristics of intangible assets and related empirical research findings. I then review the accounting rules for intangible assets and research on the impact of these reporting rules. Finally, I review the literature on debt covenants and intangible assets.

2.1 Intangible Assets and Goodwill

Intangible assets are commonly defined as assets that lack physical substance but are likely to yield future benefits.[8] International Accounting Standards No. 38 defines intangible assets as nonmonetary assets without physical substance held for use in the production or supply of goods or services, for rental to others, or for administrative purposes: (a) that are identifiable; (b) that are controlled by an enterprise as a result of past events; and (c) from which future economic benefits are expected to flow to the enterprise. [9]

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[8] According to the FASB' SFAC 6, par. 25, assets are probable future economic benefits controlled by and accruing to a particular entity as a result of past transactions or events.

[9] There are resources, such as research and development expenditure, that are not recognized as intangible assets in financial statements because the associated future economic benefits are not *reliably* expected to be generated.

Intangible assets account for a significant portion of U.S. corporate assets and goodwill is the primary type of intangible asset.[10] Between 2005 and 2011, goodwill comprised 14-15% of total assets for approximately half of the U.S. public firms that reported goodwill on their balance sheets. Li and Sloan (2009) show that from 1997 to 2007 goodwill as a percentage of total assets doubled - a significant increase in the amount of goodwill on U.S. corporate balance sheets.

Intangible assets have three prime economic characteristics. First, intangible assets are risker than tangible assets because future cash flows generated by intangible assets are associated with a greater degree of uncertainty than those produced by tangible assets. For example, the economic definition of goodwill is the ability to earn abnormal returns on invested capital. A company's ability to earn abnormal returns on invested capital is a function of its ability to maintain some competitive or other economic advantage, often for many years in the future. Accordingly, goodwill by definition is associated with cash flows with a very high degree of uncertainty. Second, some intangible assets (such as goodwill) are not separable from the firm, which makes piecemeal resale of these assets impossible. Third, intangible assets decline rapidly in value when a firm is in financial distress, and become worthless in the event of liquidation. Intangible assets are normally firm-specific and thus it is very difficult to identify a potential buyer for the asset. Given these economic characteristics, it is

[10] Goodwill arises from a business acquisition. Under current accounting practice, goodwill is measured as the difference between the purchase price and the fair market value of an acquired company's net assets.

questionable whether investors (debt or equity) find these assets relevant to their economic decisions.

The value-relevance literature provides consistent evidence that equity-holders consider intangible assets to be economic resources. Barth, Beaver, and Landsman (2001) conclude that academic research studies generally finds that intangible assets, e.g., capitalized software and goodwill, are relevant to stock market investors and that the value of intangible assets is reflected in share prices.[11] Therefore, equity-holders expect intangible assets to yield future economic benefits despite intangible assets' unique economic characteristics. Although this research suggests that intangible assets are value-relevant to equity investors, lenders are a different class of investors potentially with different perspective on the decision-usefulness of intangible assets. I discuss the literature pertaining to lenders in the last section of my literature review.

2.2 Accounting for Intangible Assets

Intangible assets are a controversial topic in the accounting community because of their unique economic characteristics (discussed in Chapter 2.1). Intangible assets are hard to value because they are associated with highly variant future cash flows, and are difficult to identify separately, which can necessitate the use of highly subjective discounted cash flow techniques in determining value. For example, goodwill impairment

[11] The literature that shows the positive association between equity market value and goodwill and capitalized software includes the following studies (Aboody & Lev, 1998; Chambers, Jennings, & Thompson II, 1999; Chauvin & Hirschey, 1994; Jennings, Robinson, Thompson, & Duvall, 1993). See Canibano, Garcia-Ayuso, and Sanchez (2000) for a detailed literature review on these topics.

tests required by current accounting practice involve the application of discounted cash flow techniques, which entail forecasts of future cash flows and the determination of discount rates, all of which is subjective and uncertain.

Not only are intangible assets difficult to objectively value, these assets might not have a defined period of time over which these assets are expected to generate cash flows. Take goodwill as an example; it is difficult to know ex ante how long a firm will maintain its ability to generate abnormal returns on invested capital. The evolution of accounting for intangible assets reflect standard-setters' attempts to provide more decision-useful information regarding intangible assets given their challenging economic characteristics.

In 1970, Accounting Principles Board Opinion No. 17 (hereafter, APB 17), Intangible Assets, deemed that all intangible assets be amortized on a straight-line basis over an assumed useful life not to exceed 40 years. APB 17 provides for the taking of impairment charges, but it is the Statement of Financial Accounting Standards No. 121 (hereafter, SFAS 121) that standard-setters provided explicit guidance regarding when to recognize and how to measure impairment losses. SFAS 121 specifies that intangible assets be tested for impairment when events or circumstances indicate potential impairments in the value of intangible assets, establishes a recoverability test to determine whether an impairment in value has occurred, and an approach to measure the impairment loss if impairment does occur.

Statement of Financial Accounting Standards No. 142 (hereafter SFAS 142), issued in 2001, takes the stand that goodwill and certain other intangible assets have

indefinite lives.[12] This standard eliminates amortization for these indefinite lived intangible assets and requires a test of impairment at least annually, which gives more prominence to impairments than prior standards. Under SFAS 142, managers must undertake a *quantitative* evaluation to screen for potential impairments by comparing the estimated fair value to the net book value of the reporting unit. Nevertheless, Accounting Standards Update No. 2011-08 removes the requirement to undertake a quantitative evaluation, and allows for a *qualitative* evaluation instead.

As discussed above, which approach, amortization or impairment, provides better information continues to be debated in the literature. If the value of goodwill is a declining function over time, goodwill amortization could potentially be informative about changes in future cash flows or risks. Several studies examine the information content of goodwill amortization. Jennings, Robinson, Thompson, and Duvall (1993) find only weak evidence of a relation between equity market value and goodwill amortization. This suggests that purchased goodwill might not be declining in value for some firms, and for those firms where it is declining in value, the actual rate of decline might differ substantially from the accounting amortization rate.

Henning, Lewis, and Shaw (2000) decompose goodwill into several components and examine the relation between stock returns and the amortization of goodwill components. They find that stock returns are negatively associated with the amortization of the residual overpayment component of goodwill but find no relation between stock

[12] The Statement of Financial Accounting Standards No. 141 (hereafter SFAS 141) was issued simultaneously with SFAS 142 in 2001. SFAS 141 eliminates pooling accounting, which means firms can no longer use pooling accounting to avoid recognizing goodwill on balance sheet.

returns and the amortization of the components of goodwill that has economic substances, such as the synergy value created by the acquisition. Moehrle, Renolds-Moehrle, and Wallace (2001) provide evidence that the amortization component in earnings does not have explanatory power to stock returns, suggesting that goodwill amortization is not informative. On the other hand, Henning and Shaw (2000) examine goodwill amortization schedules and find evidence that the choice of goodwill amortization life is predictive of future earnings, expected growth, the amount of goodwill, and future stock performance, which suggests that this choice conveys useful information. Therefore, much, albeit not all, of the the literature on goodwill amortization suggests that goodwill amortization is not informative to equity-holders.

A number of studies examine how equity-holders interpret goodwill impairments. In general, these studies find the stock market reacts negatively to goodwill impairments, and analysts revise their expectations downward on the announcement of an impairment (e.g., Bens, Heltzer, & Segal, 2007; Z. Li, Shroff, Venkataraman, & Zhang, 2011). At the same time, there is evidence that the market anticipates impairments (e.g., Chen, Kohlbeck, & Warfield, 2008; K. K. Li & Sloan, 2009; Z. Li et al., 2011).

Furthermore, Riedl (2004) finds that after SFAS 121 the decision to write-off long-lived assets (including goodwill) has a higher association with “big bath” behavior, which suggests that managers act opportunistically rather than informationally with respect to write-offs. Ramanna and Watts (2011) investigate whether under SFAS 142 managers will take advantage of the inherent flexibility in fair value estimates to realize their private interests (agency-based hypothesis) or to convey private information (private

information hypothesis). They find some evidence supporting the agency-based hypothesis. Hayn and Hughes (2006) find that managers' decisions regarding goodwill impairments are a function of prior firm performance and the characteristics of acquisitions. This evidence raises the concern that managers use the discretion integral to impairments opportunistically to satisfy their incentives rather than convey private information.

Overall, the evidence from empirical research suggests that goodwill amortization generally does not provide useful information, while impairments of goodwill can be informative but also can be used by managers to report opportunistically.

2.3 Debt Covenants and Intangible Assets

A lender's ultimate concern is whether she will get repaid. To mitigate this concern, borrowers and lenders set up debt contracts to specify borrowers' obligations, such as when to pay monthly principals and interests. Debt contracts also include a set of provisions called debt covenants that restrict borrowers' actions. For example, cash dividend to the shareholders of borrowing firms might be prohibited until the debt is repaid.

Debt covenants frequently incorporate accounting numbers (Smith Jr. & Warner, 1979) and researchers have explored the role of accounting numbers in debt covenants. Aghion and Bolton (1992) [13] suggest that debt covenants protect lenders by granting them

[13] In Aghion and Bolton (1992), the signal is exogenously given and is imperfectly correlated with the state. The true state is perfectly observable to both contracting parties although the state is not contractible. Both the state and the signal arise before the manager takes his action.

the right to alter their relationship with borrowers in certain states of the world. This implies that debt covenants are likely to be based on accounting numbers that correlate with the states of world.[14] This is especially crucial in down states of the world, due to lenders' asymmetric payoff structure. Empirical research provides evidence supporting the implication from Aghion and Bolton's (1992) model. For example, Demerjian (2007) finds evidence that debt covenants are based on financial ratios that are informative of credit risk.

Prior research questions the possibility that intangible assets present valuable resources to lenders because of the economic characteristics of these assets. Holthausen and Watts (2001) specifically argue that debt contracts frequently exclude goodwill because it becomes worthless at liquidation. Leftwich (1983) uses a sample of private debt agreements to provide evidence that goodwill and intangibles are frequently excluded from the measurement of total assets but amortization is included in the measurement of net income. This suggests that intangible assets play a minimal role in debt contracts due to the economic characteristics of these assets.

Further, the accounting standards that guide the financial reporting and measurement of intangible assets might not yield asset values lenders view as reliable. Managers employ subjective estimates to a much greater extent in the evaluation of intangible assets than tangible assets. This gives rise to opportunities to manipulate the

[14] I follow Banker and Datar and characterize the correlation between the states of world and accounting numbers in terms of sensitivity and precision of accounting numbers. In Banker and Datar (1989), sensitivity is defined as the sensitivity of signals to managers' actions and precision is defined as the inverse of the variation of the signal.

reported value of intangibles. Watts (2006) argues that goodwill estimates are typically unverifiable since the periodic estimation requires a value for the firm (or part of the firm), which is frequently not verifiable. This opens door to fraud and manipulation.

He suggests that for private contracting purpose, a conservative estimate is desired, which is why intangibles are excluded from the calculation of net assets as observed in Leftwich (1983). He also argues that managers take advantage of SFAS 142 to avoid goodwill impairments and this makes earnings "softer" and noisier. Consistent with this, several studies show that managers use discretion opportunistically in taking goodwill impairments (K. K. Li & Sloan, 2009; Ramanna & Watts, 2011).

Nevertheless, several recent studies suggest that private lenders contract on intangible assets. Loumioti (2012) examines the use of other intangible assets (i.e., intangible assets other than goodwill) as collateral. She finds that asset liquidity and redeployability, as well as borrower reputation, affect the use of other intangible assets as collateral. This paper only focuses on other intangible assets and collateral while my thesis examines both goodwill and other intangible assets and thus my thesis helps us to understand goodwill, this predominant corporate intangible asset, in debt contracts. Furthermore, my thesis investigates the role of lender characteristics in the use of intangible assets in debt contracts.

Frankel et al. (2008) and Beatty et al. (2008) investigate the use of intangible assets in net-worth covenants. They both document that TANNW is less likely to be used when intangible assets comprise a larger percentage of total assets. Beatty et al. (2008) examine the association between the use of TANNW and accounting conservatism, under

the presumption that the exclusion of intangible assets results in more conservative net-worth covenants. They do not find clear evidence supporting a positive association between TANNW use and accounting conservatism. Frankel et al. (2008) and Beatty et al. (2008) also find that firms with TOTNW have higher credit quality (in terms of credit ratings), and are larger than firms with TANNW.

The positive association between the magnitude of intangible assets and the inclusion of intangible assets in net-worth covenants suggests that the amount of intangible assets is an important factor in the use of these assets in debt covenants. These studies discussed above do not explain why this association exists, however, especially given the economic and reporting characteristics of intangible assets. In this thesis, I investigate the determinants of the role of intangible assets in net-worth covenants by examining how borrowers' and lenders' characteristics affect the decision to include intangible assets in net-worth covenants.

CHAPTER 3

HYPOTHESIS DEVELOPMENT

A lender's ultimate concern is whether she will get repaid, especially in a down state of the world. Debt covenants are designed to protect lenders by granting lenders the right to alter their relationship with borrowers in certain states of the world (Aghion & Bolton, 1992). The type of debt covenant included in a debt contract is a function of the relevance of that covenant item to the lender. For example, a lender's interest in intangible assets might be greater if the lender expects debt payments might be supported by future cash flows generated by intangible assets. In this case, lenders are concerned with states of the world in which the value of intangible assets is reduced, and consequently, intangible assets are more likely to be incorporated in debt covenants. This prediction is consistent with Guay's (2008) heretofore untested conjecture that one of the reasons intangible assets are included in net-worth covenants is that "creditors may have an interest in seeing the firm convert intangible assets to tangible assets over time." Thus, my first hypothesis is as follows:

Hypothesis 1: The probability of including TOTNW in a debt contract is positively associated with the reliance on intangible assets to fund debt payments.

An important characteristic of intangible assets is that internal information such as firm-specific private information is crucial for evaluating these assets. Take goodwill as an example, SFAS 142 requires that if it is more likely than not that goodwill has been

impaired, the amount of impairment be estimated in a manner that relies heavily on discounted future cash flow models employing managers' projections.[15] In contrast, in the event of impairment, the value of tangible assets often can be determined based on observable market values for the same or similar assets, such that it is generally easier for lenders to assess the value of tangible assets vis-à-vis intangible assets. Therefore, information asymmetry between lenders and borrowers is generally greater for intangible assets than for tangible assets.

Prior research argues that industry-specific information and access to private information are important for resolving information asymmetry between lenders and borrowers (Boot & Thakor, 2000; Dell'Ariccia & Marquez, 2004; Hauswald & Marquez, 2006). For example, prior research suggests that access to private information helps lenders design loan contracts tailored to borrowers' characteristics (Berger & Udell, 1995; S. T. Bharath, Dahiya, Saunders, & Srinivasan, 2011). This suggests that lenders' industry knowledge and access to private information are critical factors that could explain cross-sectional differences in lenders' ability to understand and rely on the reported values of intangible assets, and consequently the use of intangible assets in net-worth covenants.

Lenders with industry expertise have superior knowledge of the economic environment within which the borrower operates. It follows that these lenders should more effectively evaluate managers' assertions regarding the value of intangible assets. In

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[15] The Accounting Standards Update No. 2011-08 only requires qualitative evaluation when it is more likely than not that the fair value of a reporting unit is less than its carrying amount.

addition, lenders with superior access to borrowers' private information should have superior knowledge of the financial position and expected future performance of the firm. Therefore, I predict that lenders with industry expertise and/or access to private information are more likely to include intangible assets in net-worth covenants. This leads to my second and third hypotheses.

Hypothesis 2: The probability of including TOTNW in a debt contract is positively associated with Lenders' industry expertise.

Hypothesis 3: The probability of including TOTNW in a debt contract is positively associated with Lenders' access to private information.

CHAPTER 4

RESEARCH DESIGN

4.1 Empirical Models

I employ the following multinomial logistic model to test my hypotheses. I use a multinomial logistic model because it allows me to include not only loans with TOTNW and TANNW, but also loans that do not have net-worth covenants (hereafter, NNW).[16] This mitigates sample selection bias that might arise if the sample is limited to loans with either TOTNW or TANNW.

$$Probability(NWS_{COV}=m) = \gamma_0 + \gamma_1 DebtTan + \gamma_2 IndLend + \gamma_3 RelaLend + \gamma_4 GW + \gamma_5 OthIntan + \gamma_6 ZeroIntan + \gamma_7 DebtTan*ZeroIntan + \gamma_8 RatingExist + \gamma_9 RatingInv + \gamma_{10} ACQ + \gamma_{11} Size + \gamma_{12} BTM + \gamma_{13} LEV + \gamma_{14} ROA + \gamma_{15} LOSS + \gamma_{16} Maturity + \gamma_{17} SyndicateSize + \gamma_{18} LoanSize + \gamma_{19} Yield + \gamma_{20} FIN_{cov} + \gamma_{21} GEN_{cov} + \gamma_{22} Revolver \quad (1)$$

My dependent variable (NWS_{COV}) is a variable indicating the type of net-worth covenant included in a debt contract. This variable equals three if a contract includes TOTNW, two if it includes TANNW, and one if it includes NNW.

[16] I also estimate the logistic model of Frankel el al. (2008), including my variables of interest. In results not tabulated, I get similar qualitative results as my multinomial logistic model.

My primary variables of interest are (1) *DebtTan,* (2) *IndLend*, and (3) *RelaLend*.[17] *DebtTan* is the debt-to-tangible assets ratio, and is a measure to capture the reliance on intangible assets to make debt payments. A detailed discussion on this variable is in Chapter 4.2 of my thesis. *IndLend*, is one of two lender characteristics, and captures the extent to which the lenders have industry expertise. *IndLend* is the number of participant lenders who have experience lending to the borrowing firm's industry over the 5 years preceding the loan issue date. *RelaLend* is the second lender characteristic, and captures lenders' access to private information.[18] *RelaLend* is the average time that the lead lender(s) has been the lead arranger for the borrowing firm. The assumption underlying this variable is that lenders with a longer relationship with the firm have greater access to private information. The latter two variables are intended to capture lender characteristics that might mitigate the information asymmetry around intangible assets. Chapter 4.3 below provide a detailed discussion of my measurement procedures for these two proxies employed in my analysis. Appendix A summarizes variable descriptions.

The signs of the coefficients on *DebtTan*, *IndLend*, and *RelaLend* (i.e., γ_1, γ_2, and γ_3) test my three hypotheses. I predict all three coefficients (γ_1, γ_2, and γ_3) to be positive based on my expectation that the reliance on intangible assets to make debt payments

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[17] Table 5.3 shows that *IndLend* and *RelaLend* are negatively correlated with *Yield*. This provides univariate support that these two contracts could mitigate information asymmetry between borrowers and lenders and thus facilitate a reduction in the premium.

[18] Following prior research (Berger & Udell, 1995; S. Bharath, Dahiya, Saunders, & Srinivasan, 2007), *RelaLend* capture two key characteristics to proxy for lenders' information access, previously transacted and the length of relationship.

(*DebtTan*), lenders' industry expertise (*IndLend*), and access to private information (*RelaLend*) are positively associated with the use of TOTNW.[19]

I include the remaining variables include in the regression model to control for additional factors that could explain the type of net-worth covenant included in a debt contract. Frankel et al. (2008) find that the magnitude of goodwill (*GW*) and other intangible assets (*OthIntan*) are positively associated with the use of TOTNW. Thus, I expect γ_4 and γ_5 to be positive. I include an indicator variable (*ZeroIntan)* and an interaction term (*DebtTan*ZeroIntan*) to address a potential limitation of *DebtTan* for firms with zero intangible assets, which I discuss more fully in Chapter 4.2. Beatty et al. (2008) show that firms with TOTNW have higher credit ratings than those with TANNW. Following Frankel et al. (2008), I include variables for the existence of firm credit ratings (*RatingExist*) and a credit rating above investment grade (*RatingInv*) and expect the coefficients on these variables to be positive.[20] In addition, prior research suggests that information asymmetry is mitigated for bigger firms. This implies that it might be easier for bigger firms to borrow based on their intangible assets. As a result, I expect to find a positive coefficient on firm size (*Size*). Finally, I follow Frankel et al. (2008) and control for the book-to-market ratio (*BTM*), leverage (*LEV*), the return on assets ratio (*ROA*), and the indication of negative net income (*LOSS*) because they show

[19] Consistent with my prediction, Duke and Hunt (1990) show that firms with covenant restriction related to net assets have higher debt-to-tangible assets ratio than those without such restrictions.

[20] Since a large portion of the firms do not have a firm credit rating available (as shown in Table 2 Panel A, only about 46% has credit rating), Beatty et al. (2008) use a pooled cross-sectional regression to predict credit ratings for their sample firms. Instead of adopting the methodology of Beatty et al. (2008), I follow Frankel et al. (2008) to control for the differential credit quality across the covenant groups by controlling a majority set of the firm characteristics that are used by the prediction model of Beatty et al.(2008).

that these firm characteristics might be associated with the choice of including net-worth covenants.

Since the choice of net-worth covenants is simultaneously chosen with all other contract characteristics, I also control for several other contract characteristics. I include the maturity of the loan (*Maturity*), the syndicate size (*SyndicateSize*), the amount of the loan (*LoanSize*), the loan yield (*Yield*), and use of financial covenants (FIN_{cov}) and non-financial covenants (GEN_{cov}). Based on prior research (Beatty et al., 2008; Frankel et al., 2008), I expect the coefficients on *Maturity*, *SyndicateSize*, *LoanSize*, and *Yield* to be positive,[21] but I do not provide formal interpretations for the coefficients on these variables due to the potential simultaneity between the choice of net-worth covenants and contract characteristics. Appendix A provides detailed variable definitions.

4.2 Reliance on Intangible Assets to Make Debt Payments

I use the debt-to-tangible assets ratio prior to the inception of the loan to capture the degree to which debt payments are expected to rely on the future cash flows generated by intangible assets. Although both intangible and tangible assets can produce cash flows to support the liabilities a firm assumes, prior research suggests that lenders prefer tangible assets because they can capture the value of tangible assets in default states (Almeida & Campello, 2007). This suggests that when tangible assets are not

[21] Frankel et al. (2008) set TANNW covenant relative to TOTNW covenant as the dependent variable, while I set the dependent variable to be TOTNW relative to TANNW. Thus, the coefficients of Frankel et al. (2008) are in the opposite direction of the coefficients in my regression.

sufficient to fully support the debt, I expect lenders to place greater reliance on intangibles assets to support debt repayment. [22]

Consistent with this, the debt-to-tangible asset ratio is decreasing in the fraction of debt supported by tangible assets. An important characteristic of this ratio is that it acknowledges lenders' preference for tangible assets over intangible assets, by first, taking into account the cash flow generating ability of tangible assets.[23] For example, a debt-to-tangible ratio of two suggests that $2 of debt is supported by $1 of tangible assets. This implies that the other $1 is dependent on cash flows generated by intangible assets.[24] At the very least, the higher the value of this variable, the greater the likelihood that lenders might need to look to the cash flows generated by intangible assets for debt payment. Thus, cross-sectional variation in this ratio should capture cross-sectional variation in the reliance on intangible assets to meet debt payments.

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[22] One might ask if, similarly, it is expected that lenders are concerned about tangible assets when their welfare is tied to these assets. Although it seems the expectations are not different between intangible and tangible assets, there is an imbedded difference, in that lenders favor tangible assets over intangible assets for concerns such as liquidation. Therefore, the reliance on intangible assets to make debt-related payments is after considering the effect of tangible assets.

[23] Using debt-to-tangible asset ratio to capture the reliance on intangible assets to make debt payments has the following advantages over the debt-to-intangible (or intangible-to-debt) asset ratio: (1) the debt-to-tangible asset ratio infers reliance on intangible assets based on the pressure on tangible assets to make debt-related payments: the more burden on tangible assets, the more likely that intangible assets contribute to the debt related payments. Thus, it gives priority to tangible assets in terms of repaying debt, which is consistent with lenders' consideration; (2) it makes the research design easier to follow prior research because it is important to control for the magnitude of intangible assets as suggested by Frankel et al. (2008) and Beatty et al. (2008). If the debt-to-intangible asset (or intangible asset-to-debt) ratio were used, the interpretation of these ratios would be complicated by controlling for intangible assets.

[24] This assumes that tangible assets are not reported on the balance sheet at less than liquidation value. If tangible assets are reported on the balance sheet at less than fair value, this induces measurement error in my proxy that works against my ability to document results consistent with my first hypothesis.

A limitation of this measure surfaces in situations where a firm has zero intangible assets.[25] In the example above, the implication that the other $1 is dependent on cash flows generated by reported intangible assets makes sense only if reported intangible assets are greater than zero. If not, the ratio does not provide the correct interpretation about the reliance of debt payment on reported intangible assets because firms with zero reported intangible assets cannot rely on such assets. Thus, to address this issue, I include an indicator variable (*ZeroIntan*) that equals one when a firm has no intangible assets and zero otherwise and a term that captures the interaction between *DebtTan* and *ZeroIntan* (i.e., *DebtTan***ZeroIntan*).

4.3 Lenders' Industry Expertise and Relationship Lending

As previously discussed, there are two dimensions of lender characteristics, industry expertise and access to private information, which I predict to be associated with the use of TOTNW in debt covenants. There is, however, limited guidance from prior research regarding how to measure lenders' industry expertise. Conceptually, lenders who have transacted with the borrower's suppliers, customers, and/or competitors are likely to be more knowledgeable about the industry than lenders who have not. Empirically, this means that industry expertise could be derived from the knowledge

[25] In my model, I include a dummy variable for zero intangible assets (*ZeroIntan*) instead of a dummy variable for zero Goodwill (*GW_Zero)* used by Frankel et al. (2008). *ZeroIntan* covers the case of zero goodwill and better suits my research questions underlying my model. In Frankel et al. (2008), *GW_Zero* is significant factor in determining the choice between TOTNW and TANNW (Frankel et al.-Table 5, page 104). Consistent with this, my univariate analysis (Table 2, Panel B) shows that *ZeroIntan* is significantly higher for TANNW than TOTNW. Therefore, I need to include *ZeroIntan* as a control variable in my model as I focus on the choice of TOTNW relative to TANNW.

learned from the borrowers' competitors, which helps lenders to better understand the business environment within which the borrower operates. Thus, industry expertise can help lenders to better evaluate the expected future cash flow and risk underlying intangible assets.

To capture industry expertise empirically, I take the number of syndicated lenders with experience lending to the borrowers' competitors (i.e., firms in the same Fama-French 49 industry as the borrower) during the 5-year period preceding the loan issue date, and scaled it by the total number of syndicated lenders of the loan.[26] I include only participant lenders in this measure, because prior research suggests that the "familiarity" between the borrowers and potential participants is likely to be an important consideration in the loan structure when the borrower is less transparent (Ivashina & Sun, 2011; Sufi, 2007).

Prior research suggests that "relationship lenders" who build a close relation with borrowers likely know more about the borrowing firm's operations and have greater access to private information inside the firm than other lenders (S. Bharath et al., 2007; Petersen & Rajan, 1994; Sufi, 2007).[27] Extant studies capture "relationship lenders" in a way that centers around the idea that relationship lenders have transacted previously with the firm (S. T. Bharath et al., 2011; S. Bharath et al., 2007).

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[26] The classification of industry group does not affect my results. Similar qualitative results are obtained when industry is defined by 2-digit SIC.

[27] The special nature of lending relationships has been the subject of extensive theoretical and empirical research in finance. While there is no precise definition of "relationship banking," the basic idea is that the financial intermediary develops a close relationship with borrowing firms through its interaction with the firm over time (Berger & Udell, 1995; Boot, 2000).

Moreover, prior research suggests that relationship length is an important aspect of a relationship (Berger & Udell, 1995; Diamond, 1991; Petersen & Rajan, 1994). Based on this idea, I measure relationship lending as the average number of years between the first time a lender is a lead arranger for a borrower and the current loan for each loan package. This measure captures the idea that the longer lenders have transacted with the firm, the more likely lenders have extensive knowledge of the firm's operations and well-developed channels of communication with managers (S. Bharath et al., 2007; Sufi, 2007). [28] This information advantage is expected to help relationship lenders gain private information regarding managers' projections pertaining to the performance of intangible assets.

[28] Lead arrangers assume an important role in the syndicate process and the ex post contract monitoring because they design the syndicate for the borrower, offer the syndicate to the potential participant lenders, take a share of the syndicate, and monitor the borrower ex post the contract inception (Ivashina & Sun, 2011; Sufi, 2007).

CHAPTER 5

SAMPLE AND DESCRIPTIVE STATISTICS

5.1 Sample Selection

My sample is drawn from the Dealscan database from Loan Pricing Corporation and includes 66,454 loan facilities activated between 1992 and 2007 with nonmissing loan amounts, loan maturity, and loan yield information.[29] I exclude facilities that cannot be matched with Compustat Annual data, which reduces my sample to 45,170 facilities.[30] To ensure that the financial data used in my analyses would be available to contracting parties at the time of contract formation, I use annual accounting data gathered prior to the activation date. Finally, I limit my sample to observations where all the necessary variables for all tests are available. This yields a final sample of 30,468 loan facilities for 7,684 borrowers.[31] Table 5.1 outlines my sample selection procedures.

Within this sample, 3,828 facilities have TOTNW and 3,684 facilities have TANNW. This is consistent with prior research (e.g. Frankel et al., 2008), which finds that the number of loan facilities with TOTNW is approximately the same as those with TANNW.

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[29] My sample period ends in 2007, prior to the crunch hit at the end of that year.

[30] The sample loss is similar to that reported by Bradley and Roberts (2004). Dealscan includes debt contracts for private firms, which contributes to the sample loss when merging with Compustat.

[31] I collapse package-level information into facility level, following prior literature (e.g., Frankel et al., 2008).

Table 5.1 Sample Selection

Sample Period: 1992-2007[a]	
Numbers of facilities on Dealscan	66,454
Number of facilities from Dealscan that can be matched with Compustat	45,170
Number of facilities with sufficient information to construct variables used in tests	30,468
Number of borrowers	7,684

[a]The sample of lending agreements is drawn from the Dealscan database and deals' active-dates are between 1992-2007.

5.2 Descriptive Statistics

Table 5.2 reports summary descriptive statistics for the sample. For ease of interpretation, I report the unlogged amounts in the summary statistics for the five logged variables (*Size*, *Yield*, *Maturity*, FIN_{cov}, and GEN_{cov},). Panel A of Table 5.2 presents the descriptive statistics for my full sample, which includes observations with both types of net-worth covenants (i.e., TOTNW and TANNW) and those with no net-worth covenant (i.e., NNW).

On average, my sample firms report goodwill (*GW*) comprising 9% of their total assets. About half of the firms have credit ratings (*RatingExist* and *RatingInv*). My sample firms varies a lot in market size (*Size*) and are highly leveraged (*Lev*). The lender and loan characteristics variables display a high level of variations as well (e.g., *RelaLend*, *SyndicateSize*, *Yield*, *LoanSize*, *Maturity*, FIN_{COV}, and GEN_{cov}). Overall, Panel A of Table 5.2 shows that my sample varies widely in firm, lender, and loan characteristics. I also follow Frankel et al. (2008) and examine my sample across time,

Table 5.2 Descriptive Statistics

Panel A: Descriptive statistics for the whole sample					
(N=30,468)	M	Me	St	25t	75t
Firm Characteristics					
GW	0.0	0.0	0.1	0.0	0.1
OthIntan	0.0	0.0	0.0	0.0	0.0
ZeroIntan	0.7	1.0	0.4	0.0	1.0
RatingExist	0.4	0.0	0.5	0.0	1.0
RatingInv	0.4	0.0	0.5	0.0	1.0
Size	5,8	62	22,	12	2,9
BTM	0.9	0.5	9.3	0.3	0.7
LEV	2.9	0.7	38.	0.3	1.6
ROA	0.0	0.0	0.1	0.0	0.0
LOSS	0.2	0.0	0.4	0.0	0.0
DebtTan	0.7	0.7	0.4	0.5	0.8
Lender Characteristics					
IndLend	0.3	0.2	0.3	0.0	0.6
RelaLend	1.1	0.3	1.7	0.0	1.9
SyndicateSize	15.	8.0	22.	2.0	18.
Loan Characteristics					
Yield	18	16	14	75.	25
LoanSize	0.2	0.1	2.1	0.0	0.2
Maturity	44.	42.	30.	23.	60.
FINcov	1.2	1.0	1.4	0.0	2.0
GENcov	2.0	1.0	2.4	0.0	3.0
Revolver	0.5	1.0	0.5	0.0	1.0

For variable definitions see Appendix A.

Table 5.2 Descriptive statistics (continued)

Panel B: Differences for sample with Total-asset NW (Tangible NW) versus No Net-worth covenant

	Means for three covenant type groups			Differences		
	TOTNW (N=3,828)	TANNW (N=3,684)	NNW (N=22,956)	TOTNW vs. TANNW	TOTNW vs. NNW	TANNW vs. NNW
Firm Characteristics						
GW	0.12	0.04	0.09	>**	>**	<**
OthIntan	0.018	0.01	0.025	>**	<**	<**
ZeroIntan	0.76	0.86	0.71	<**	>**	>**
RatingExist	0.369	0.223	0.51	>**	<**	<**
RatingInv	0.366	0.221	0.50	>**	<**	<**
Size	2,098.7	952.2	7315.5	>**	<**	<**
BTM	0.66	1.02	0.92	<*	≤	≥
LEV	1.60	2.62	3.24	<	<*	<
ROA	0.03	0.00	0.02	>**	>**	<**
LOSS	0.18	0.25	0.20	<**	<*	>**
DebtTan	0.74	0.56	0.77	>**	<**	<**
Lender Characteristics						
IndLend	0.41	0.29	0.34	>**	>**	<**
RelaLend	1.11	0.98	1.20	>**	<**	<**
SyndicateSize	16.55	7.72	16.31	>**	≥	<**
Loan Characteristics						
Yield	184.37	208.34	180.6	<**	≥	>**
LoanSize	0.28	0.27	0.29	≥	≤	≤
Maturity	43.80	36.15	46.01	>**	<**	<**
FIN_{cov}	2.25	2.13	0.99	>**	>**	>**
GEN_{cov}	3.42	2.13	1.74	>**	>**	>**
Revolver	0.64	0.71	0.54	<**	>**	>**

**,* denotes significance at the 0.01, 0.05 or better for the t-statistics of mean differences. The underline "_"denotes significance at the 0.01or better for the Z-score of Wilcoxon-Mann-Whitney test. For variable definitions see Appendix A.

but I do not find significant trends in the use of TOTNW versus TANNW across my sample years (results not tabulated).

Panel B of Table 5.2 presents mean differences for the sample, partitioned by whether the firm has TOTNW, TANNW, or NNW. The first three columns present mean values for the three groups. The last three columns (i.e., the fourth-sixth columns) provide the signs of the differences among the three groups. I also report the statistical significance of Wilcoxon-Mann-Whitney test in addition to the t-statistics of mean differences. This is because compared to t-test, Wilcoxon-Mann-Whitney test is more robust against outliers and heavy tail distributions, which might be a valid concern for my sample (e.g., *Size* has a mean of 5,891.67 while median is only 627.85 as shown in Panel A of Table 5.2).

My primary firm characteristic of interest is the debt-to-tangible assets ratio (*DebtTan*). Consistent with hypothesis 1, *DebtTan* is higher for firms with TOTNW than firms with TANNW. In addition, I find that firms with TOTNW have more *GW* and *OthIntan*, are more likely to have public debt (*RatingExist*) and investment-grade debt (*RatingInv*), and to be larger (*Size*) and more profitable (*ROA* and *LOSS*) than those with TANNW. These findings are not surprising because it would be easier for firms with better credit quality, larger size, and better financial performance to get their intangible assets to support lending, which is consistent with prior research (e.g., Frankel et al. 2008). In general, the statistics for firm characteristics suggest that firms with TOTNW tend to have better credit quality, and are larger in size and financial performance than firms with TANNW.

Another interesting observation from the firm characteristics is that *BTM* is the lower and below one for TOTNW group (with mean of 0.66). In contrast, *BTM* is highest and above one for TANNW group (with mean of 1.02). Prior literature uses the book-to-market ratio (*BTM*) above one as the indicator of a firm with impaired goodwill (e.g., Ramanna and Watts, 2011) because the fair value of the firm as proxied by market value is less than the book value of the firm for *BTM* greater than one, assuming the whole firm as the reporting unit for goodwill.[32] Thus, the observation of the differences in *BTM* suggests that the TOTNW group (TANNW group) has intangible assets that are less (more) likely to be impaired. This is consistent with my prediction for Hypothesis 1, to the extent the reliance on intangible assets to make debt payments is more likely when such assets are less likely to be impaired.

IndLend captures lenders' industry expertise via the participant lenders who have lent to a firm in the current borrower's industry in the preceding 5 years. *RelaLend* captures lenders' access to private information as the average number of years of the lead lender(s) has been the lead arranger for the current borrower. Loans with TOTNW have a higher mean value of *IndLend* of 0.41 than those with TANNW, which have *a* mean value of *IndLend* of 0.29. Similarly, loans with TOTNW have a higher mean value of *RelaLend* vis-à-vis loans with TANNW *(*mean value of 1.11 versus 0.98). This provides preliminary support for my hypotheses 2 and 3 that lenders' industry expertise and access to private information promote the use of TOTNW.

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[32] Another interpretation of the book-to-market ratio (*BTM*) is that the ratio represents growth opportunities (i.e., Low *BTM* is associated with higher growth). The finding that *BTM* is lower for TOTNW group is also consistent with the idea that growth firms rely more on intangible assets.

Loan characteristics also differ between loans with TOTNW and TANNW as shown by the significant mean differences between the two groups. Loans with TOTNW have lower *Yield*, longer *Maturity*, more FIN_{COV} and GEN_{COV}, and less likely to be *Revolver.* This suggests it is important to control for differences in loan characteristics in my multivariate analysis.

The last two columns of Table 5.2 present mean differences for the sample with TOTNW (and TANNW) versus NNW. These results document significant differences across three groups as the means of most variables are statistically different.[33] In sum, when viewing columns 4-6 together, all the firm, lender, and loan characteristics shown here vary significantly among the three groups and thus it is important to include all these variables in my multivariate analysis.

Table 5.3 presents Spearman correlations among the set of variables employed in my regression analyses. I find that *RatingExist* is correlated with *Size* with a coefficient of 0.60, which is consistent with rating agencies tending to rate larger firms. *DebtTan* is positively correlated with *Lev* with a correlation coefficient of 0.58, which suggests that it is important to control for *Lev* in the multivariate analysis. Next, correlations with lender characteristics are presented. A positive correlation of 0.28 between *IndLend* and *RelaLend* suggests that the underlying constructs they capture are different although not completely independent. Moreover, *IndLend* and *RelaLend* are negatively correlated with

[33] One might notice that the NNW group has a higher value of *DebtTan* and *Relalend* than both the TOTNW and TANNW groups. Recall that this is univariate analysis. The focus of my examination is the use of TOTNW relative to TANNW, and the NNW group is included in the sample to address the selection bias.

Table 5.3 Correlations (N=30,468)

	OtherIntan	*RatingExist*	*Size*	*BTM*	*Lev*	*ROA*	*Loss*	*DebtTan*	*IndLend*	*RelaLend*	*SyndicateSize*	*Yield*	*LoanSize*	*Maturity*	FIN_{COV}	GEN_{COV}	*Revolver*
GW	**0.35**	**0.08**	**0.11**	**-0.07**	**-0.06**	**0.06**	**-0.03**	**0.33**	**0.06**	**0.10**	**0.18**	**0.00**	**0.02**	**0.16**	**0.12**	**0.15**	**-0.03**
OthIntan		**0.15**	**0.24**	**-0.09**	**-0.04**	**0.02**	**-0.01**	**0.22**	**0.11**	**0.13**	**0.15**	**-0.05**	**-0.11**	**0.13**	**0.07**	**0.10**	**-0.04**
RatingExist			**0.60**	**-0.07**	**0.25**	**-0.01**	**-0.10**	**0.35**	**0.24**	**0.31**	**0.39**	**-0.35**	**-0.36**	**0.04**	**-0.12**	**-0.05**	**-0.11**
Size				**-0.35**	**-0.07**	**0.22**	**-0.29**	**0.20**	**0.27**	**0.33**	**0.49**	**-0.64**	**-0.45**	**0.05**	**-0.21**	**-0.13**	**-0.14**
BTM					**0.52**	**-0.33**	**0.13**	**-0.09**	**-0.03**	**-0.05**	**-0.10**	**0.20**	**-0.07**	**-0.04**	**0.02**	**0.01**	**0.03**
LEV						**-0.50**	**0.15**	**0.58**	0.01	**0.09**	**0.09**	**0.10**	**-0.32**	**-0.02**	**-0.09**	**-0.03**	**-0.09**
ROA							**-0.70**	**-0.28**	**0.11**	**0.06**	**0.10**	**-0.31**	**0.16**	**0.07**	**0.03**	**-0.01**	**0.04**
LOSS								**0.08**	**-0.14**	**-0.11**	**-0.16**	**0.36**	**0.02**	**-0.06**	**0.03**	**0.06**	0.01
DebtTan									**0.07**	**0.17**	**0.27**	**0.00**	**-0.23**	**0.11**	**-0.01**	**0.07**	**-0.14**
IndLend										**0.28**	**0.38**	**-0.29**	**0.08**	**0.04**	**0.08**	**0.14**	**0.13**
RelaLend											**0.26**	**-0.29**	**-0.11**	**-0.02**	**-0.04**	0.00	0.01
SyndicateSize												**-0.24**	**-0.08**	**0.28**	**0.10**	**0.22**	**-0.14**
Yield													**0.20**	**0.09**	**0.22**	**0.23**	**-0.06**
LoanSize														**0.15**	**0.25**	**0.26**	**0.24**
Maturity															**0.12**	**0.19**	**0.05**
FIN_{COV}																**0.74**	**0.08**
GEN_{COV}																	**0.03**

Bold indicates significance at the 0.05 level or better. For variable definitions see Appendix A.

Yield. This is consistent with the argument that lenders' industry expertise and relationship lending could help, to some extent, to mitigate information asymmetry between borrowers and lenders and thus facilitate a reduction in the premium charged by lenders. This provides comfort that my two proxies for lender characteristic capture lenders' information advantages.

CHAPTER 6

RESULTS

6.1 Results of Multinomial Logistic Regression

Table 6.1 reports the results of a multinomial logistic regression that examines the determinants of TOTNW in debt contracts. As mentioned above, I employ a multinomial logistic model to include loans with NNW in the analysis. This is to address a potential sample selection issue I would otherwise have if loans without NNW were not included. I set the dependent variable (NWS_{COV}) to be TOTNW, TANNW, or NNW depending on the type of covenants included in the debt contracts. I present the results for the comparison between the TOTNW group and the TANNW group in Table 6.1, which is the focus of my paper.

The positive coefficient on *DebtTan* provides support for Hypothesis 1 that the inclusion of TOTNW is positively associated with the reliance on intangible assets to make debt payments. The coefficient on *DebtTan* indicates that 1% increase in *DebtTan* is associated with an increase of 2.608 in the probability of having TOTNW, relative to the probability of having TANNW. [34] This result helps us to understand the prior finding that the magnitude of intangibles is a determinant of TOTNW. By demonstrating a situat-

[34] This is based on the relative risk ratio, which is the ratio of probability being in one group versus another group. For example, the probability of having one nonbank lender in contracts with TOTNW is 0.2 and with TANNW is 0.01. Then the relative risk ratio of having one nonbank lender associated with contracts with TOTNW is 20. In other words, one more nonbank lender is associated with an increase of 20 in

Table 6.1 Multinomial Logistic Regression Results

Variables	Predicted Sign	Coefficient	Std. Err.	Z	P-value
DebtTan	+	2.608	0.76	3.31	0.001**
IndLend	+	1.273	0.12	2.66	0.004**
RelaLend	+	0.969	0.02	-1.48	0.069
GW	+	43.689	17.22	9.58	0.000**
OthIntan	+	34.328	38.01	3.19	0.001**
ZeroIntan	?	0.965	0.21	-0.17	0.433
DebtTan*ZeroIntan	?	1.129	0.34	0.41	0.341
RatingExist	+	1.470	1.45	0.39	0.348
RatingInv	?	0.612	0.60	-0.50	0.309
ACQ	+	0.825	0.19	-0.82	0.206
Size	+	1.141	0.04	3.63	0.000**
BTM	?	0.938	0.05	-1.18	0.119
LEV	?	0.996	0.01	-0.44	0.330
ROA	?	2.005	0.60	2.31	0.330
LOSS	?	1.036	0.11	0.33	0.371
Maturity	+	1.100	0.05	2.16	0.015
SyndicateSize	+	1.012	0.00	3.21	0.001**
LoanSize	+	1.369	0.24	1.76	0.039*
Yield	+	0.749	0.09	-2.31	0.039*
FIN_{cov}	?	0.562	0.05	-6.26	0.000**
GEN_{cov}	?	1.847	0.14	8.30	0.000**
Revolver	?	0.863	0.05	-2.60	0.005**
Intercept	?	0.182	0.07	-4.23	0.000**
N		30,468			
Pseudo-R-Squared		24.63%			

**,*denotes significance at the 0.01, 0.05 or better. For variable definitions see Appendix A.
Dependent variable equals to TOTNW or TANNW or NNW; Only results for TOTNW versus TANNW are shown below. Coefficients are in relative risk ratio. Industry controls are included. Firm-clustered standard errors are reported. P-value is reported for one-tailed test results.

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probability of being in contracts with TOTNW. For borrowers with one percent of *DebtTan*, the probability of having TOTNW in debt contracts is 0.2608 and having TANNW is 0.1. Then the relative risk ratio of one percent of *DebtTan* is associated with an increase of 2.608 in the probability of having contracts with TOTNW relative to TANNW.

ion where intangible assets are viewed as economically relevant, my analysis disputes the argument in the literature that liquidation concern is the only consideration in lenders' decision to include intangible assets in debt contracts.

Lenders' industry expertise (*IndLend*) is strongly positively associated with the inclusion of TOTNW, consistent with Hypothesis 2. A unit increase in *IndLend* is associated with an increase of 1.273 in the probability of having TOTNW relative to having TANNW. This finding suggests that lenders with greater industry expertise are more likely to include intangible assets in debt contracts, which provides us a more complete picture of why intangible assets are sometimes in debt contracts. The statistically insignificant association between access to private information (*RelaLend*) and the inclusion of TOTNW suggests that access to private information is not an important factor in the decision to include intangible assets in the net-worth covenant. Alternatively, the lack of a result on this variable might be due to inadequate control for the differences between the comparison groups. I address this concern in the next section of my thesis, Chapter 6.2, which presents the results of my changes analysis.

The positive coefficients on *GW* and *OthIntan* are consistent with prior research findings that the magnitude of *GW* and *OthIntan* are associated with the choice of TANNW versus TOTNW. Further, the coefficients on the additional control variables included in my model are consistent with prior research (Frankel et al., 2008; Beatty et al., 2008), as I find positive coefficients on *SyndicateSize*, *LoanSize*, *Yield*, and *Size.*

Overall, the results in Table 6.1 indicate that TOTNW is more likely to be used when lenders expect to rely on the cash flows associated with intangible assets to make

debt payments (*DebtTan*) and when lenders have more industry expertise (*IndLend*). These results hold even after controlling for the association between TOTNW and the amount of intangible assets that has been documented in prior research. In so doing, these results further our understanding of how intangible assets get used in debt contracts. Further, my results demonstrate that in some circumstances, lack of value upon liquidation is not lenders' primary concern as suggested by prior studies (e.g., Watts 2006).

6.2 Analysis on the Subsample that Firms Switch between Net-worth Covenants

I perform a change analysis using a subsample of firms that switch between the two types of net-worth covenants. That is, firms change from having TANNW covenants to TOTNW covenants, and vice versa. This analysis is intended to address the concern that the associations documented in the levels analysis are potentially driven by inadequate controls for time-unvarying unobservable factors, such as the differences between the comparison groups. Furthermore, the changes analysis helps to establish a causal relationship between my hypothesized determinants and covenant choice.

I calculate the change in firm characteristics variables (Δ*Variables*) as the difference between the variable measured *before* the firm's first contract with a TOTNW (TANNW) covenant and the variable measured *before* a subsequent contract with a TANNW (TOTNW) for the same firm. I measure the differences in lender and loan characteristics as the differences between the variable measured at the time of the firm's

first contract with a TOTNW (TANNW) covenant and the time of the firm's subsequent contract with a TANNW (TOTNW) covenant.

In Table 6.2, I present the mean and median values of the differences for each of the hypothesized determinants (i.e., *DebtTan*, *IndLend*, and *RelaLend*). Table 6.2 Panel A examines the case in which firms switch from TOTNW to TANNW. *DebtTan* is significantly smaller prior to entering a contract with TOTNW as opposed to later entering a contract with TANNW. This suggests that a decrease in lenders' need to rely on the cash flows associated with intangible assets to make debt payments (*DebtTan*) is associated with a switch to a contract that excludes intangible assets in net-worth coven ants. This finding is consistent with my Hypothesis 1.

Table 6.2 Mean and Median Analysis for the Subsample that Switch between TOTNW and TANNW

Panel A: Switch from TOTNW into TANNW

N=331	*ΔDebtTan*	*ΔIndLend*	*ΔRelaLend*
Mean	-0.027**	-0.127**	-0.728**
Median	-0.012	0.000	-0.500

Panel B: Switch from TANNW into TOTNW

N=553	*ΔDebtTan*	*ΔIndLend*	*ΔRelaLend*
Mean	0.073**	0.096**	0.323**
Median	0.030	0.000	0.333

****,***denotes significance at the 0.01, 0.05 or better. The underline "_"denotes significance at the 0.01or better for the p-value of Wilcoxon signed-rank test. For variable definitions see Appendix A.

In addition, the mean values of *IndLend* and *RelaLend* are also smaller while the median value of *IndLend* is not. This suggests that lenders on the earlier loan with TOTNW are stronger in terms of and access to private information (*RelaLend*) than lenders who are party to the later loans with TANNW. This analysis provides support for Hypothesis 3 but not much for Hypothesis 2.

Table 6.2 Panel B examines the case in which firms switch from TANNW to TOTNW. In contrast to the results in Panel A, *DebtTan* and *RelaLend* increase significantly.[35] These results provide additional support for the first and third of my hypotheses.

In additional to the multivariate analysis documented in Table 6.2, I conduct a multivariate analysis and present the results in Table 6.3. I set the dependent variable equal to one when a firm switches from TANNW to TOTNW, and zero when it switches from TOTNW to TANNW. If *DebtTan* is positively associated with the use of TOTNW, I expect the change in *DebtTan* (*ΔDebtTan*) to be positively associated with changing from TANNW to TOTNW, and Similarly for *ΔIndLend* and *ΔRelaLend.*

As shown in Model 1, *ΔDebtTan*, *ΔIndLend*, and *ΔRelaLend* are positively associated with the change from TANNW to TOTNW. These results confirm the results of my levels analysis that the reliance on intangible assets to make debt payments (*DebtTan*) and lenders' industry expertise (*IndLend*) are important factors in determining the use of intangible assets in net-worth covenants. Furthermore, the coefficient on *Rela-*

[35] The average period between the switch from TOTNW to TANNW is 3.82 years and the average period for switch in the opposite direction is 4.33 years.

Table 6.3 Logistic Regression for the Subsample that Switch between TOTNW and TANNW

	Model 1			Model 2		
Variables	Coefficient	Std. Err.	P	Coefficient	Std. Err.	P
ΔDebtTan	2.133	0.53	0.000**	2.427	0.59	0.000**
ΔIndLend	0.722	0.19	0.000**	0.567	0.20	0.005**
ΔRelaLend	0.132	0.04	0.000**	0.168	0.04	0.000**
ΔGW	10.621	1.71	0.000**	10.36	1.74	0.000**
ΔOthIntan	12.499	3.25	0.000**	11.45	3.75	0.000**
ΔMaturity	0.119	0.11	0.129	0.177	.011	0.117
ΔSyndicateSize	0.014	0.01	0.015*	0.009	0.01	0.146
ΔFINcov	-0.320	0.19	0.045*	-0.370	0.19	0.063
ΔGENcov	1.204	0.17	0.000**	1.071	0.18	0.000**
ΔRevolver	0.142	0.17	0.198	0.120	0.17	0.491
ΔYield	0.241	0.25	0.171	0.502	0.26	0.057
ΔLoanSize	-0.525	0.14	0.000**	-0.360	0.15	0.016*
ΔBTM	0.390	0.14	0.003**	0.999	0.19	0.000**
ΔROA	0.215	0.99	0.413	-2.54	1.07	0.018*
ΔSizeR				0.74	0.11	0.000**
Intercept	0.324	0.086	0.0001**	0.259	0.09	0.000**
N		884			884	
Pseudo-R-Squared		26.13%			31.32%	

****,***denotes significance at the 0.01, 0.05 or better. For variable definitions see Appendix A.
Dependent variable: from TOTNW into TANNW: 0; from TANNW into TOTNW: 1. P-value is reported for one-tailed test results.

Lend is also significantly positive in change analysis. This finding suggests that the lack of results in the levels analysis is due to insufficient power, and provides support for my third hypothesis that access to private information promotes the use of intangible assets in net-worth covenants.

In Model 2, I add the change in equity market size-decile (*ΔSizeR*). Market size is commonly viewed as an important dimension of firm information environment (Wiedman, 1996). I control for *ΔSizeR* because one possible explanation for the result of *ΔIndLend* and *ΔRelaLend* is that as a firm grows bigger, there is more information out there about the firm and thus, lenders feel more comfortable to include intangible assets in net-worth covenants rather. This suggests that the inclusion of intangible assets can be due to better information available to lenders about intangible assets rather than better industry knowledge and access to private information for lenders. *ΔDebtTan, ΔIndLend*, and *ΔRelaLend* remain significantly positive, which provides additional support for all of my three hypotheses.

Taken together, the results of my levels and changes analysis provide support for my predictions that *DebtTan*, *IndLend*, and *RelaLend* are determinants for the choice of including intangible assets in net-worth covenants. These three factors contribute to our understanding of the role of intangibles in debt contracts.

CHAPTER 7

FUTURE RESEARCH

This paper examines the association between three borrower and lender characteristics and the decision to include intangible assets in net-worth covenants. Future research could examine how recent accounting standards for intangible assets, such SFAS 141 and 142, affect the relation between these three factors and the use of TOTNW. Frankel et al. (2008) find some evidence suggesting that the use of TOTNW is reduced following the adoption of SFAS 141 and 142. Since Frankel et al. (2008) do not investigate why the magnitude of intangible assets are associated with the inclusion of intangible assets in net-worth covenants, their study does not address how or why SFAS 141 and 142 affect the use of intangible assets in net-worth covenant. An examination of the impact of SFAS 141 and 142 on the three borrower and lender characteristics will help us to understand how accounting standards affect the use of an accounting item in debt covenants. For example, I expect debt contracts require a borrower to have higher reliance on intangible assets to include TOTNW following SFAS 141 and 142, if SFAS 141 and 142 on average lead to less informative reported numbers of intangible assets.

I could also investigate the impact of the deliberation process and adoption of SFAS 141 and 142 on debt covenants. Prior research focuses on how managers react to the adopted accounting standards when they are facing the effect of the new standards on existing debt contracts. Little research exists on how the deliberation process affects

debt contracts initiated during this process and how the deliberation process and ultimate adoption of accounting standards differentially affect debt contracts. SFAS 141 and 142 provide an interesting setting to examine these issues because the original exposure drafts differ significantly from the adopted standards and SFAS 141 and 142 took place over a fairly short window. This mitigates the concern that other changes in the credit market might explain observed associations.

Ramanna (2008) finds that 21 industry associations lobbied FASB in the deliberation process of SFAS 141 and 142. This implies that firms in these industries anticipated being disproportionally affected by SFAS 141 and 142. Focusing on firms in these industries, I plan to examine how debt contracts change for these industries through the different stages in the deliberation process, as well as following adoption of SFAS 141 and 142. This examination will help us to understand how the deliberation process of accounting regulation (and the resulting uncertainty) impact debt contracts and what different effects the deliberation process and the adoption of accounting standards have on debt contracts.

CHAPTER 8

CONCLUSION

Intangible assets are an important and significant asset on corporate balance sheet. The use of intangible assets in debt contracting, however, is questioned by prior research (Holthausen and Watts, 2001;Watts, 2006). This is because intangible assets can have no liquidation value, associate with future cash flow with high uncertainty, and are reported based on highly subjective estimates.

While prior researchers are skeptical about the role of intangible assets in debt contracts, recent studies document the inclusion of intangible assets in TOTNW and use as collateral (Frankel et al., 2008; Loumioti, 2012). In particular, Frankel et al. find that the inclusion of intangible assets in net-worth covenant, one the most frequently used financial covenant, is a function of the magnitude of intangible assets. Given the arguments by prior research, such a relation is not expected. Thus, this result triggers the question of why and what we miss in prior research. In this dissertation, I attempt to answer these questions, by examining three potential determinants of the use of TOTNW.

The theoretical model by Aghion and Bolton (1992) suggests that debt covenants are likely to be based on accounting numbers that correlate with the states of world. In the context of net-worth covenants, I argue that intangible assets would be included in the following circumstances: when a firm relies on intangible assets to fund

debt payments, these assets are a more sensitive signal of the states of the world, and when lenders have industry expertise and access to private information, these assets are less noisy signal of the states of the world.

I at first conduct a levels analysis and find that the use of TOTNW is more likely when firms have higher debt-to-tangible assets ratio and when lenders have industry expertise. These findings are consistent with my predictions that intangible assets are relevant to debt covenants when the reliance on intangible assets to make debt payments is higher, and when lenders have industry expertise. The insignificant result on lenders' access to private information might suggest this factor is not an important determinant in the decision of including intangible assets in net-worth covenants. Alternatively, this potentially can be contributed to insufficient controls in this cross-sectional test.

I then do a changes analysis to mitigate this insufficient control concern, and furthermore to give causal implications to my findings. I find results consistent with my three predictions that the use of TOTNW is a function of the reliance on intangible assets to make debt payments is higher, lenders industry expertise, and access to private information. Furthermore, I find that all three factors remain significant when controlling for the change in firm equity market size-decile, which captures the change in firm information environment.

Overall, my findings provide new evidence on the determinants of the use of TOTNW, which helps us to understand why the prior finding that the relation between the magnitude of intangible assets and the use of TOTNW exists and thus contributes to the recent stream of research on the use of intangible assets in debt contracts. I add to

the literation on implication of lenders characteristics on debt contracts by identifying two lender characteristics that affect inclusion of intangible assets in net-worth covenants. Furthermore, I find that the effect of lenders characteristics on debt contracts is robust to the borrowing firms' information environment.

Future research might extend to examine the effects of recent accounting standards on intangible assets. I can investigate how these accounting standards interact with the three determinants in this study to affect the inclusion of intangible assets in net-worth covenants. Another angle of investigating the effect of accounting standards is to examine how the deliberation process affects the design of debt contracts and how the effects of the deliberation process is different from the adoption of standards. The accounting standards related to intangible assets, SFAS 141 and 142, provide a unique setting to examine these research questions. Building on the three factors examined in this study, I can focus on how the deliberation process and the adoption affect the inclusion of intangible assets in net-worth covenants in terms of these factors.

APPENDIX A

VARIABLE DEFINITIONS

Variable Name	Variable Description
NWS_{COV}	Equal to 3 for Total-asset net-worth covenant, 2 for Tangible net-worth covenant and 1 for no net-worth covenants.
IndLend	The number of participant lenders who have lent to the same industry as the current borrower in the preceding five years, as of the total number of participant lenders.
RelaLend	The average of the time length (i.e., in years) that lead lenders have been the lead arranger for the current borrower. I identify the lead arrangers following Bharath et al 2007. That is, a bank is not described as "participant" is treated as a lead bank.
DebtTan	The ratio of total liability divided by tangible assets.
GW	The amount of goodwill scaled by total assets.
OthIntan	The amount of other intangible assets scaled by total assets.
ZeroIntan	An indicator variable equal to one when the firm has zero intangible assets, zero otherwise.
Yield	The log of the mark up (in basis points) over LIBOR (i.e., London Interbank Offered Rate).

Variable Name	Variable Description
LoanSize	The amount of loan divided by total assets.
Maturity	The log of loan maturity (in months).
FIN_{cov}	The log of the number of financial covenants.
GEN_{cov}	The log of the number of nonfinancial covenants.
RatingExist	An indicator variable equal to one if the S&P issuer long-term rating exist for the firm, and zero if the rating is missing.
RatingInv	An indicator variable equal to one if the S&P issuer long-term rating is investment grade or above and zero otherwise. I set the variable to zero when the rating is missing.
Size	The log of equity market value. Equity market value is in millions.
BM	Book value of equity divided by market value of equity.
LEV	Total liabilities divided by market value of equity.
ROA	Net income divided by total assets.
LOSS	An indicator variable equal to one if net income is negative and zero otherwise.
ACQ	The acquisition made in the firm's 2-digit SIC code scaled by the total market value of all firms in the same industry group, in the year before the debt contract, following Frankel et al. (2008).
ΔVariable	The differences between the variable measured right before a firm at first has a contract with a total-asset NW and measured right before switching to a tangible-asset NW, vice versa.

Variable Name	Variable Description
ΔSizeR	The difference between the equity market size decile that a firm is in when it at first has a contract with a total-asset NW and when it later switch to a tangible-asset NW, vice versa.

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